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ABSTRACT

Science, Math and Technology is one of the units of a K-6 unified science curriculum program. The unit consists of four organizing sub-themes: (1) science (with activities on observation, comparisons, and the scientific method); (2) technology (examining simple machines, electricity, magnetism, waves and forces); (3) mathematics (addressing skill development in shape recognition, data plotting, and graph reading and construction); and (4) the built environment (with investigations of urban wildlife, waste disposal, land use, pollution and overpopulation). Each sub-theme contains an introductory statement, student activities for lower primary grades (K-3) and upper primary grades (4-6), and a teacher's copy for each student worksheet. All student worksheets are ready for duplicating. (ML)

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SCIENCE, MATH, AND TECHNOLOGY

SCIENCE

Science is a very diverse subject with both qualitative and quantitative aspects of learning. Science is not only composed of facts about our natural world but also includes discovery, comparsions and descriptions. These basic concepts should be learned before students fully understand the scientific method.

LOWER PRIMARY

A. What is that? (Discovering the world around yourself.) (1) Why is that there? (2) Something looks different?

B. How do I tell about my discovery? (1) Discuss the events you just saw. (2) Draw your discovery. (3) Words that describe the discovery.

C. Why is that different? (1) Compare the discovery with something you know. (2) Discuss, draw and write about the difference. (3) Try and explain what that difference means.

UPPER PRIMARY

D. Does it always happen that way? (1) Can you repeat the discovery? If not, why not? (2) Can you develop an experiment that might give you clues to the problem? (3) Do all problems have solutions?

E. What is the scientific method? (1) What is a hypothesis? (2) What is a theory? (3) Can you always follow the scientific method?

SE 046 349

K - 6 Science Curriculum

Joint Project by Math Science Nucleus
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Discover

have you ever asked the question

- Why is that there?
- What is that?
- Something looks different?

You have just started the process of problem solving

In order to keep developing this idea you must continue to

- describe
- compare
- quantitate

How do you communicate to another person of your discovery?

Describe

act like a detective

- write down what you have experienced
- leave no clue unrecorded
- use words, graphs and pictures to completely make that experience unique

Have you solved the problem or explained a situation...
if not you have to

- compare
- quantitate

So you haven't solved the problem nor explained the situation.

What now?

Compare

- think of events or situations in the past that were similar
- ask people or look in books for similar events
- find some part of the situation that can help solve or explain

oh no... it still isn't solved

well...

Look at it again ... try to repeat and record like an experiment

Quantitate

does it always happen that way?

if not ...

why not?

By this time if you don't know why...

make an educated guess,

but still keep searching —

(that's most of the fun!)

name _____

TEACHER SHEET

This is a coloring exercise with discussion. Bring out with the children the idea that the boy has discovered something? Continue the dialog to bring out how many eggs? Color of eggs? What kind of bird could have laid the egg? Is the little boy bothering the nest? Will it cause any problems?

What is the boy looking at?

name _____

What is the boy looking at?

name _____

TEACHER SHEET

This coloring exercise also opens up a discussion and writing exercise on what kind of organisms live in the grass. Not only can you have the children list what they see in the picture, but for them to go outside and discover and describe what they see.

Write down what the boy is looking at.

name

Write down what the boy is looking at?

i.e. bees

TEACHER SHEET

Children should be able to find and write:

grass
snail
bee
flower or bud or another organism
leaves
dirt

name _____

Write down what the boy is looking at.

name.

Write down what the boy is looking at?

i.e. bees

name

Look in your classroom. Find something you never noticed. Draw it.

TEACHER SHEET

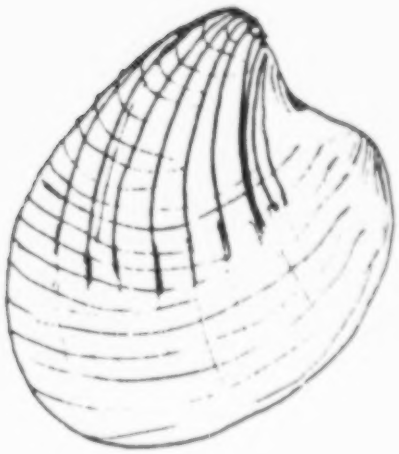
This exercise trys to increase their observational skills in their classroom. Have the children get up and look for something new and then have a discussion with the children on what is there. You can even bring something or change the room around to see if they focus on a new item in the classroom.

name

Look in your classroom. Find something you never noticed. Draw it.

name

Why are these two shells different?



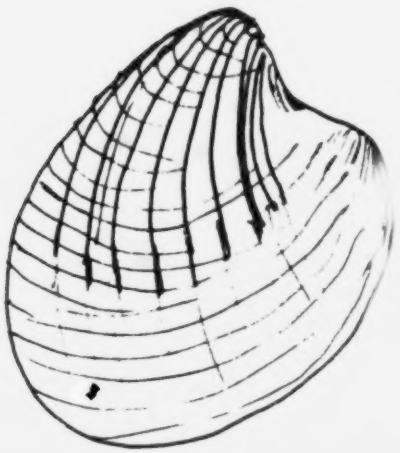
TEACHER SHEET

One shell is a clam and the outer is a snail. More importantly is to get your children to compare the shape (one is open the other is coiled); the direction of lines; and other parameters that they can come up with. Graph your results on the board is the following manner:

	clam	snail
shape		
lines		
where they may live		
position		

name

Why are these two shells different?



name

Rita wants to live on an island in the Pacific Ocean. How can Rita get information so she is prepared to survive on this island? Describe what she will encounter.

TEACHER SHEET

This exercise gets the students to begin realizing that information from books supplements learning. That if someone wants information on a subject that they can go to a school, city or home library.

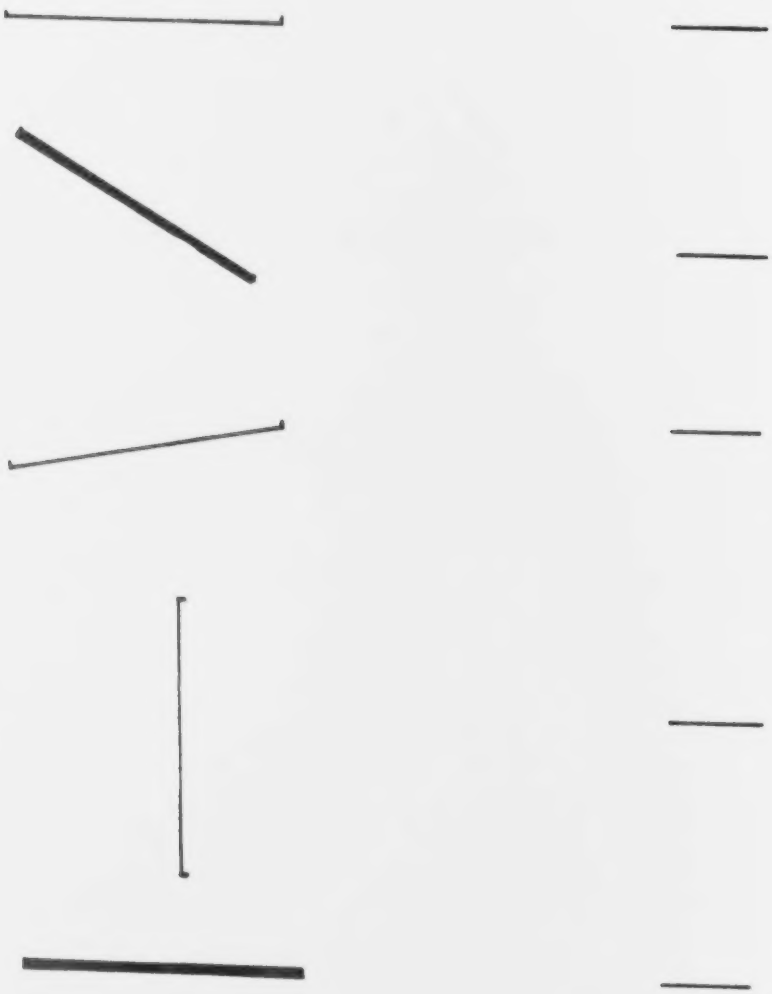
After the students get information on what to expect on an island, have them relate their readings with a situation. Introduce the word ANALOG, something that you can compare with.

name

Rita wants to live on an island in the Pacific Ocean. How can Rita get information so she is prepared to survive on this island? Describe what she will encounter.

name

Let's measure the different lines.



measurement

Which weighs the most? neither

1 lb feathers 1 lb of lead

Why? they both weigh one pound

TEACHER SHEET

This sheet gives students the situation where they are told the lines are different, but when they measure it (4 cm) they will come up with the same answer. Will most students trust the words or their own measurements.

name

Let's measure the different lines.

measurement

Which weighs the most?

1 lb feathers

1 lb of lead

Why?

teacher sheet

NAME _____

WHAT IS THE SCIENTIFIC METHOD?

Answer the following questions. Remember, there are more ways then the following to answer question

1. A scientist wants to see how color effects plants. Design an experiment that will help the scientist find out.

Key points - different color lights
same type of plant
expose plants to different light
have a control, in which to compare

2. A scientist wants to see if two rocks are the same. What can that scientist do to figure if they are the same?

Key points - write down what minerals are in the rock
- compare them to see if they are the same minerals
- do the rocks have similar density
- same color?

3. A scientist wants to find out if people who smoke cigarettes have more deaths due to cancer. How can that scientist find out?

this is a hard one

Key points - find out how many people smoke and to find out if there is a higher percentage that die then people who don't smoke
- what percentage is due to death by cancer

NAME _____

WHAT IS THE SCIENTIFIC METHOD?

Answer the following questions.

1. A scientist wants to see how color effects plants. Design an experiment that will help the scientist find out.

_____
_____
_____
_____
_____
_____

2. A scientist wants to see if two rocks are the same. What can that scientist do to figure if they are the same?

_____
_____
_____
_____
_____
_____

3. A scientist wants to find out if people who smoke cigarettes have more deaths due to cancer. How can that scientist find out?

_____
_____
_____
_____
_____
_____

SCIENCE, MATH AND TECHNOLOGY
TECHNOLOGY

Technology is the applied side of science and math in industry. However, not all parts of science and math and their respective research can turn into technology. Commonly you hear the term "Research and Development" better known as R&D. This refers to the science and math that has the potiential of turning into an applied technology. Technology in the United States has an added factor, if it doesn't make money than it isn't a used technology. Technology is a very broad subject, that only the basics can be taught in the elementary schools. These units reflect an elementary child's world, and the technology that they are mostly familiar with. So, most of the items reflect the technology that toys are made of, household items and useful skills that children should begin to acquaint themselves with.

LOWER PRIMARY

A. SIMPLE MACHINES - What are levers, wheels and axles, pulleys, screws, wedges, gears and inclined planes? How are these simple machines used? Do simple machines make life easier? Could we live without simple machines?

B. ELECTRICITY - What is a force that repels and attracts? What do we mean by positive and negative charges? Can humans become charged? What conducts electricity? What is an electric circuit? Why do toys need batteries?

UPPER PRIMARY

C. MAGNETISM - What causes magnetism? What is the north and south pole? What is the difference between electricity and magnetism? Why do items that can be picked up by a magnet also conduct electricity?

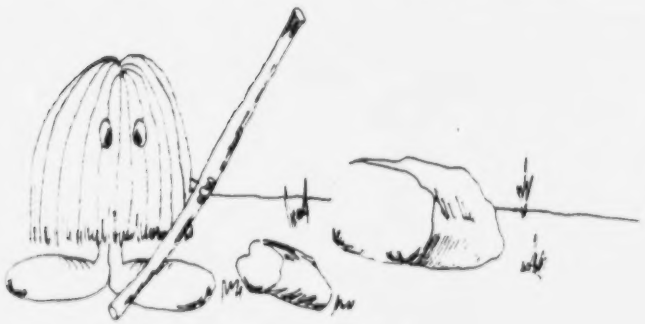
D. WAVES - What is sound? What is light? Do waves just refer to water? How fast can waves move? How fast does sound and light move? What are different frequencies?

E. FORCES - What does force mean? Can we calulate how large a force is? What is mass? What does acceleration mean? What does centrifugal, centripetal, gravitational, magnetic, and nuclear, all have in common?

TECHNOLOGY
KINDERGARTEN - SIMPLE MACHINES

Explain to your students what a lever is. A lever is basically a simple machine consisting of a rigid body pivoted on a fixed fulcrum. Before you give them this exercise, you will have to explain somehow to your students the term "rigid body" and "fulcrum." The most familiar lever is the see-saw. The rigid body is where the students sit, and the fulcrum is the base that supports the rigid body. You can ask them if a see-saw would work if the fulcrum was closer to one person than the other. It won't because it would not be in the center, unless the children using it were of different weight. Illustrate other levers like a scissor or a nutcracker. Point out that levers help make it easier to lift, move or break heavy or large objects. In this picture, Moppy must use the smaller stone as the fulcrum or Moppy will not be able to move the large rock.

name _____



How can Moppy move the big rock?

lever

name _____

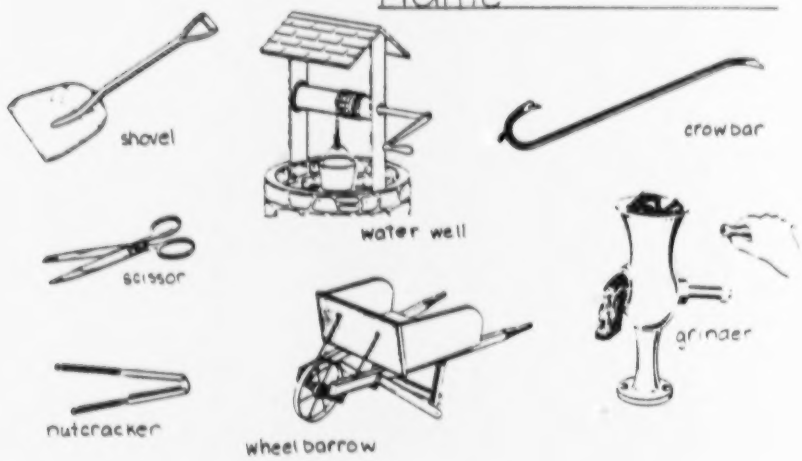
How can Moppy move the big rock?

lever

TECHNOLOGY
GRADE 1 - SIMPLE MACHINES

This exercise illustrates two simple machines, levers and wheel and axle and relates it to objects that children see, but probably have not questioned why they work. Have them look for items around the house and have them figure out what simple machines they might be. Simple machines include: pulleys, springs, wedges, inclined planes, screws, gears, levers, and wheels and axles. Many machines are combinations of the simple machines.

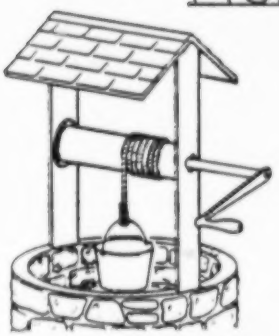
name _____



levers	wheel and axle
shovel	water well
scissor	wheelbarrow
nutcracker	grinder
crowbar	

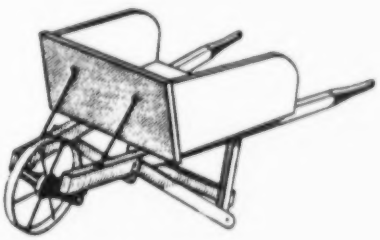
name _____

shovel


water well

crowbar

scissor


wheelbarrow

grinder

nutcracker

levers

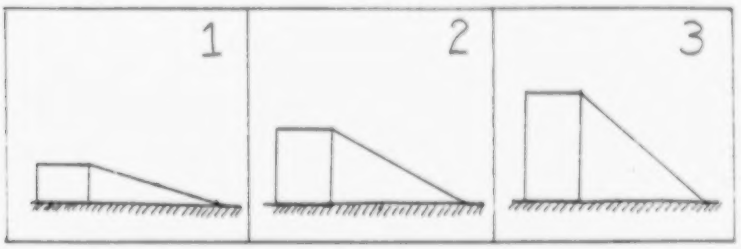
wheel and axle

TECHNOLOGY
GRADE 2 - SIMPLE MACHINES

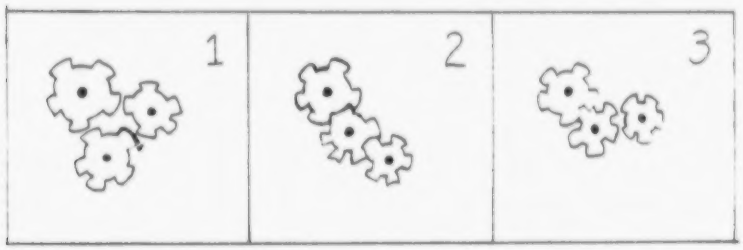
This is a continuation of the many types of simple machines. The inclined plane helps to avoid a rapid rise in elevation. Ask your students to find areas where an inclined plane is important. Point out the ramps that are used by carts, wheel chairs, and bicyles. Inclined planes also help when carrying a large load to move it more efficiently.

Gears help turn most machines. Point out to students that the ridges are called teeth, and they must interlock before they can work. Examples of where gears are used include: clocks, watches, motors, locks, and many other items.

name _____

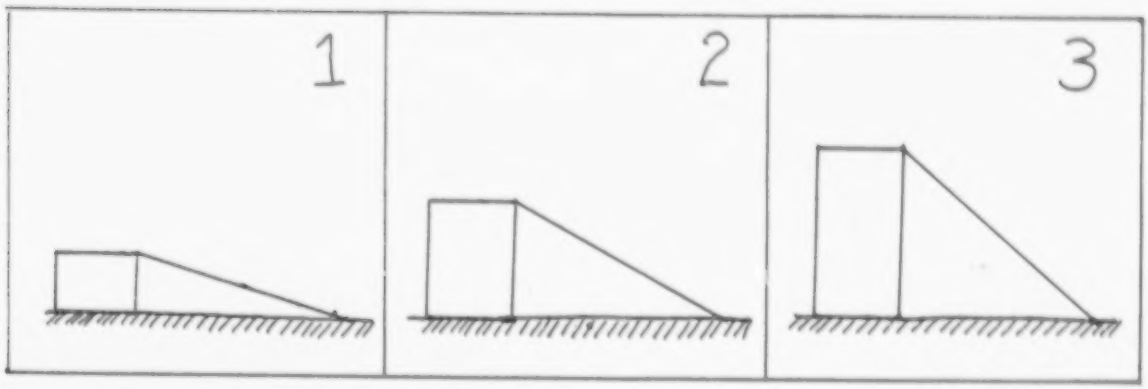


Which picture shows where pushing the box would be the hardest? 3
Which picture shows where pushing the box would be the easiest? 1



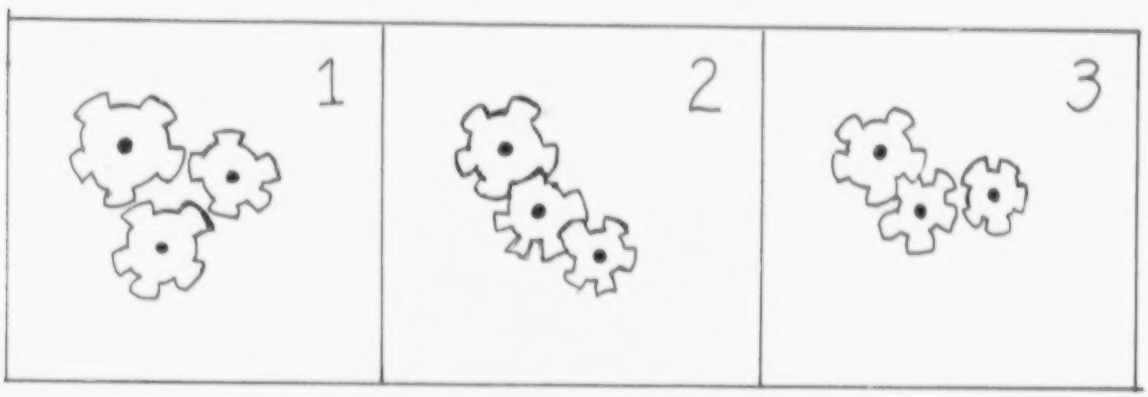
Which picture shows gears in a position that would work? 2

name _____



Which picture shows where pushing the box would be the hardest? _____

Which picture shows where pushing the box would be the easiest? _____



Which picture shows gears in a position that would work? _____

TECHNOLOGY
GRADE 3 - ELECTRICITY

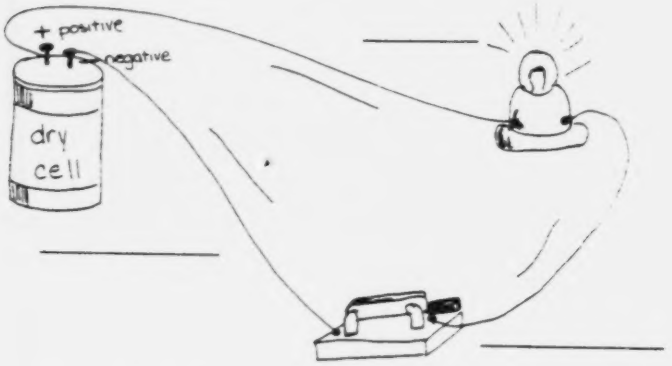
No current exists unless there is a complete pathway or circuit tharough which the electrons may flow. The flow of electricity through a circuit can be stopped by breaking or opening the circuit with a switch. By closing the cirucit the flow of electricity can be restored. Electric currents travel easily through some materials like metal and poorly through others like plastic.

The current flows from a region with excess or high number of electrons or the negative pole of a battery to a region with relatively few or low electrons or the positive pole of a battery.

name _____

Electric Circuit

This illustrates direct current (DC).



Label the direction of the current by using arrows
Label: battery, switch, light

Which way does the current flow?

_____

What does it mean to have the switch "closed"?

_____

What is an electric circuit? Do you only need a battery or can you use something else?

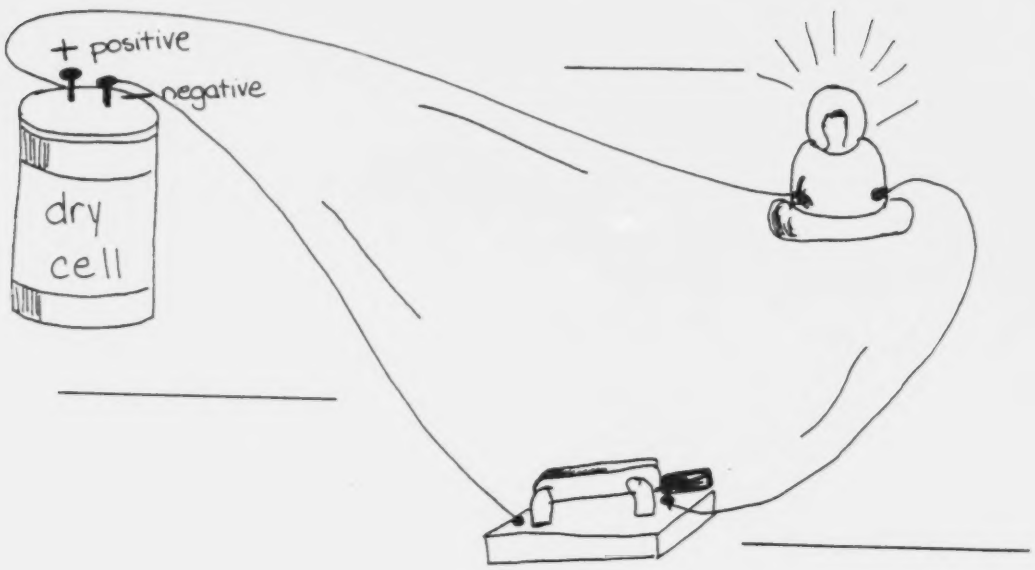
_____

_____

name _____

Electric Circuit

This illustrates direct current (DC).



Label the direction of the current by using arrows.
Label: battery, switch, light

Which way does the current flow?

_____

What does it mean to have the switch "closed"?

_____

What is an electric circuit? Do you only need a battery or can you use something else?

_____

_____

TECHNOLOGY
GRADE 4 - MAGNETISM

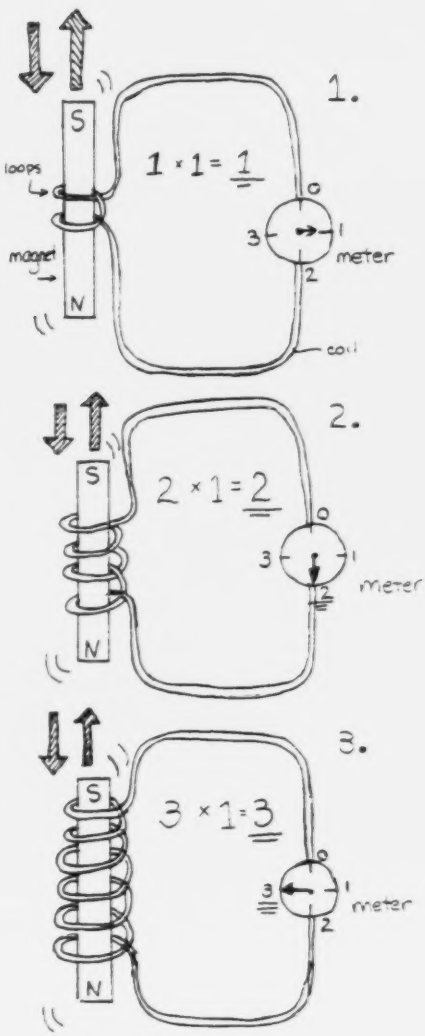
Magnetism can be produced with electrical wires. Electric current can be made to flow in a wire by simply moving a magnet in or out of a coil of wire. This is called "electromagnetic induction." This exercise illustrates Faraday's Law, " The induced voltage in a coil is numerically equal to the product of the number of loops and the rate at which the magnetic field changes within those loops." This can be used to show your students the practical side of multipication.

name _____

Electromagnetism

When a magnet is placed into a coil having twice the number of loops as in picture 1, twice as much energy is produced Show this on the meter of picture 2

If a magnet is placed into a coil with three times as many loops, then three times as much energy is produced Show this on the meter of picture 3. (It is also three times harder to push the magnet into the loops)

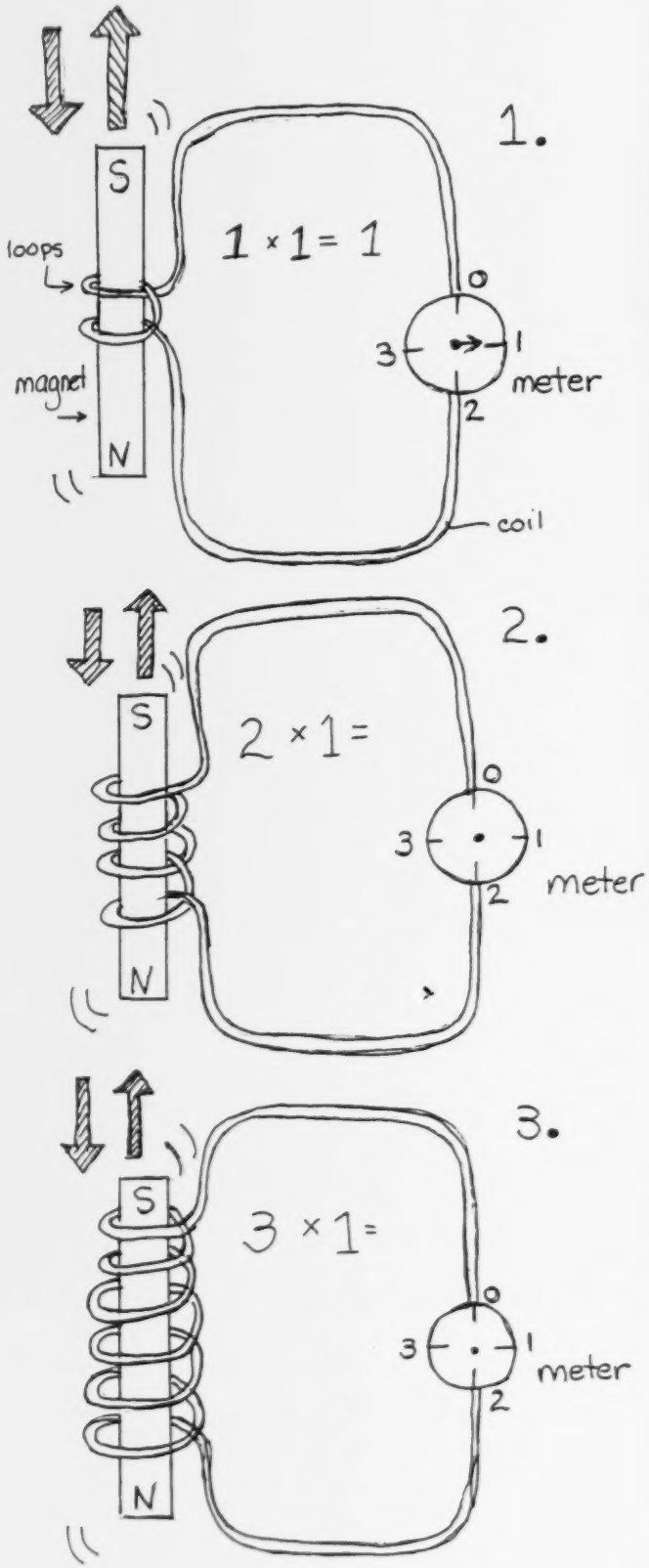


name _____

Electromagnetism

When a magnet is placed into a coil having twice the number of loops as in picture 1, twice as much energy is produced. Show this on the meter of picture 2.

If a magnet is placed into a coil with three times as many loops, then three times as much energy is produced. Show this on the meter of picture 3. (It is also three times harder to push the magnet into the loops.)



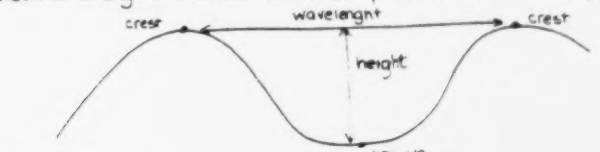
TECHNOLOGY
GRADE 5 - WAVES

Visible light is just a small part of the entire electromagnetic spectrum, as shown in the diagram. The names of the sections are merely a historical classification. The waves are the same in nature, differing only in frequency and wavelength - all have the same speed (186,000 miles per second). An isolated electric charge vibrates back and forth at a certain frequency.

This exercise illustrates the key elements of a wave. The most important parts are the wavelength and frequency. Wavelength refers to the distance between crest to crest, frequency refers to the number of times that wave moves in a given time. The smaller the wavelength the higher the frequency, the larger the wavelength the lower the frequency. The waves on the spectrum reflect these differences in frequency.

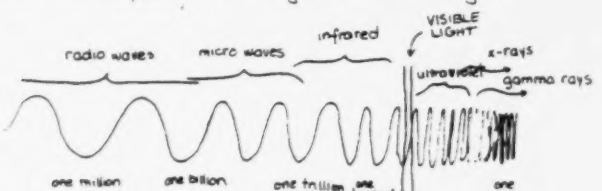
name _____

Electric charges bounce from every substance in the form of WAVES



A WAVE

Below illustrates most waves that we know. Frequency of a wave is the number of vibration in a given time (measured in hertz). The higher the frequency the smaller the wavelength, the lower the frequency the larger the wavelength.



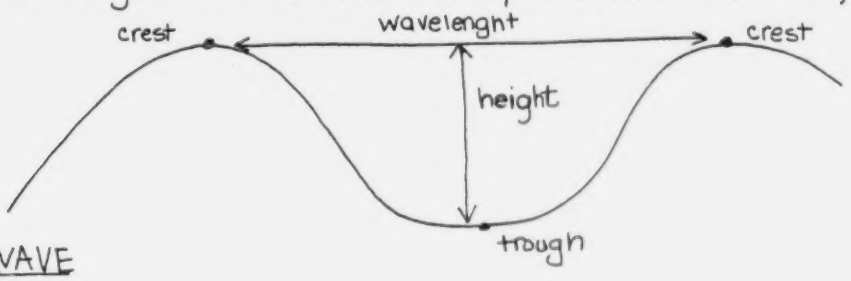
number of HERTZ
(frequency)

Which wave has the highest frequency? _____
Which wave has the lowest frequency? _____
Which wave can we see? _____
Which wave can we hear? _____
Which wave can take a picture of your bones? _____
Which wave is hotter than normal light? _____
What is the frequency of radio waves? _____
What uses micro waves? _____

BEST COPY AVAILABLE

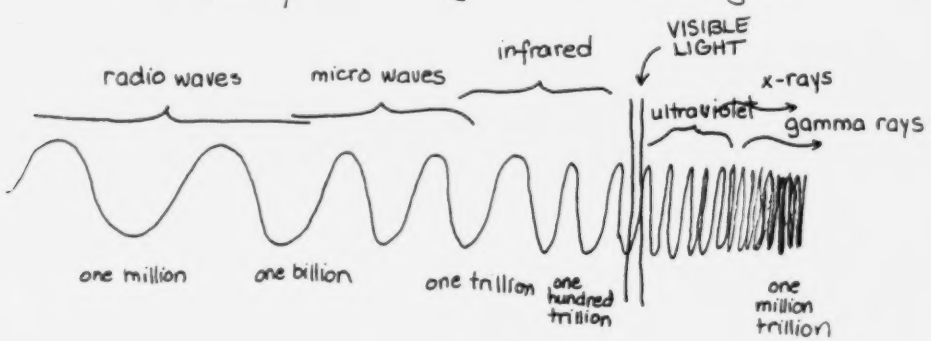
name _____

Electric charges bounce from every substance in the form of WAVES.



A WAVE

Below illustrates most waves that we know. Frequency of a wave is the number of vibration in a given time (measured in Hertz). The higher the frequency the smaller the wavelength, the lower the frequency the larger the wavelength.



number of HERTZ
(frequency)

Which wave has the highest frequency? _____

Which wave has the lowest frequency? _____

Which wave can we see? _____

Which wave can we hear? _____

Which wave can take a picture of your bones? _____

Which wave is hotter than normal light? _____

What is the frequency of radio waves? _____

What uses micro waves? _____

TECHNOLOGY
GRADE 6 - FORCES

Forces are interacting with all objects on this earth. Gravity is one of the greatest forces that holds us on this earth. To understand forces you must introduce mass and acceleration to your students. In the first exercise, a body is acceleratаed in the direction of the force acting on it. Applied in the direction of the body's motion, a force will increase the body's speed. The larger the force, the more acceleration it produces. The more mssive the body, the less the acceleration.

Force = mass x acceleration. In this exercise the numbers are given to the students. All they have to do is multiply. However, you will have to explain the terms: newtons, kilograms and meters/second/second. Explanation should be simple: newtons are how physicists measure force; kilograms are the way we measure mass; and meters/second/second is how we measure acceleration.

name _____

Force of hand, accelerates the brick

What happens to the acceleration if

A

2 hands push²

_____

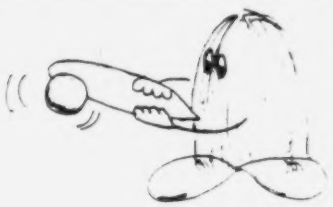
_____

B

twice the number of bricks

_____

_____



Moppy hits a ball that s .2 kilograms Moppy swings the bat at 20 meters per sec. per second. How much force did Moppy hit the ball with.

Use this equation

Force = Mass x Acceleration
(in newtons) (in kilograms) (in meters, second, second)

_____ = _____ x _____

name _____

Force of hand, accelerates the brick

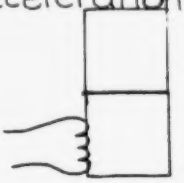
What happens to the acceleration if

A

2 hands push?

_____

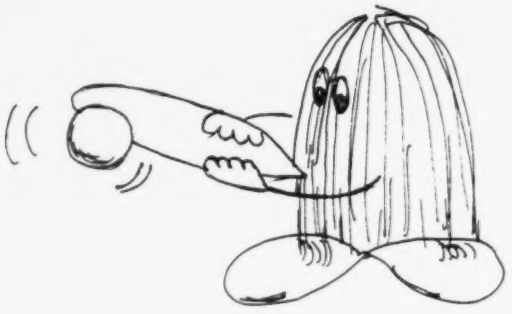
_____

B 

twice the number of bricks

_____

_____



Moppy hits a ball that is • 2 Kilograms. Moppy swings the bat at 20 meters per sec. per second. How much force did Moppy hit the ball with.

Use this equation:

Force = Mass × Acceleration

(in newtons) (in kilograms) (in meters/second/second)

_____ = _____ × _____

SCIENCE, MATH AND TECHNOLOGY
MATH

A child's box of wood blocks is probably the earliest contact with mathematical conceptions. The child learns that forms like cubes and prisms have properties that make them perfect in constructing and designing. All these designs are all forms of mathematics which is the study of numbers, forms, arrangements and associated relationships. In elementary school, students should be exposed to the different types of shapes and how they are useful in our everyday life. We can express our life in mathematics, either by an artist or a mathematician. This expression can be called a "model." These models help us to computerize our world and to quantitate our every move. Mathematics is very important, not only for scientists but for the plumber who need to know how to fit one tube into another or a builder who needs to construct a roof.

LOWER PRIMARY

A. WHAT ARE NUMBERS? - Are numbers helpful? Can we do without numbers? Do numbers mean anything to us? Are numbers used just for counting?

B. HOW DO YOU RECOGNIZE SHAPES? - What is a circle, square, rectangle, triangle and parallelogram? What is a sphere, cube, prism, cylinder, cone and rhombohedron? What is the difference between two dimensional and three dimensional? What is geometry?

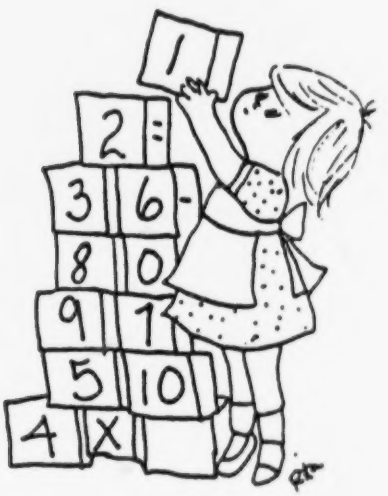
UPPER PRIMARY

C. HOW DO I PLOT DATA? - Can I use methods to show the same data? What is data? Can you put numbers of groups of things to observe it better? Can I make sense out of numbers?

D. WHAT DOES A GRAPH TELL US? - Can I compare items on a graph? What is percent? What is a bar graph? A circle graph? How many ways can I graph information? Do you learn more by graphing information?

TEACHER SHEET
KINDERGARTEN - MATH

In this coloring and handwritting exercise you can start a discussion about why numbers are important. Students feel a great sense of pride when they learn to count, but you must emphasize that is only the beginning. Emphasize that numbers are all around the children but they are hidden. It is up to the child to "find" those numbers and expose it to the rest of the class. Have them look at license plate numbers, see if any numbers repeat themselves from car to car. Have them question their clothes size and shoe size. Have them fiqure out what it really means.



Numbers

name _____

numbers

TEACHER SHEET
FIRST GRADE - MATH

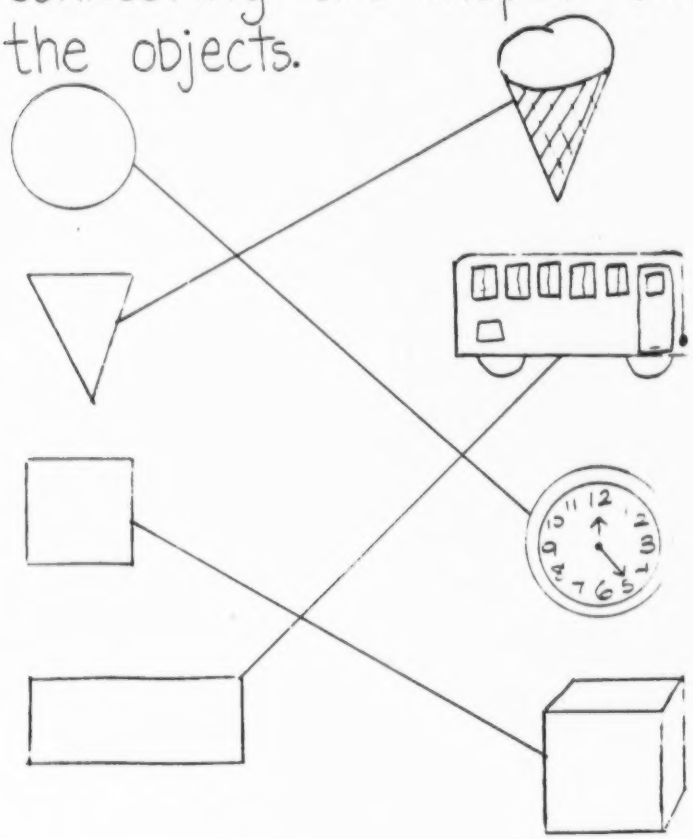
Sheet A - This sheet allows students to discover the shapes of objects they see around them.

Sheet B - This is a counting and coloring exercise. Discuss with the children how to recognize shapes in nature. Bring out the fact that many shapes of different colors can be found in our natural environment.

Sheet A

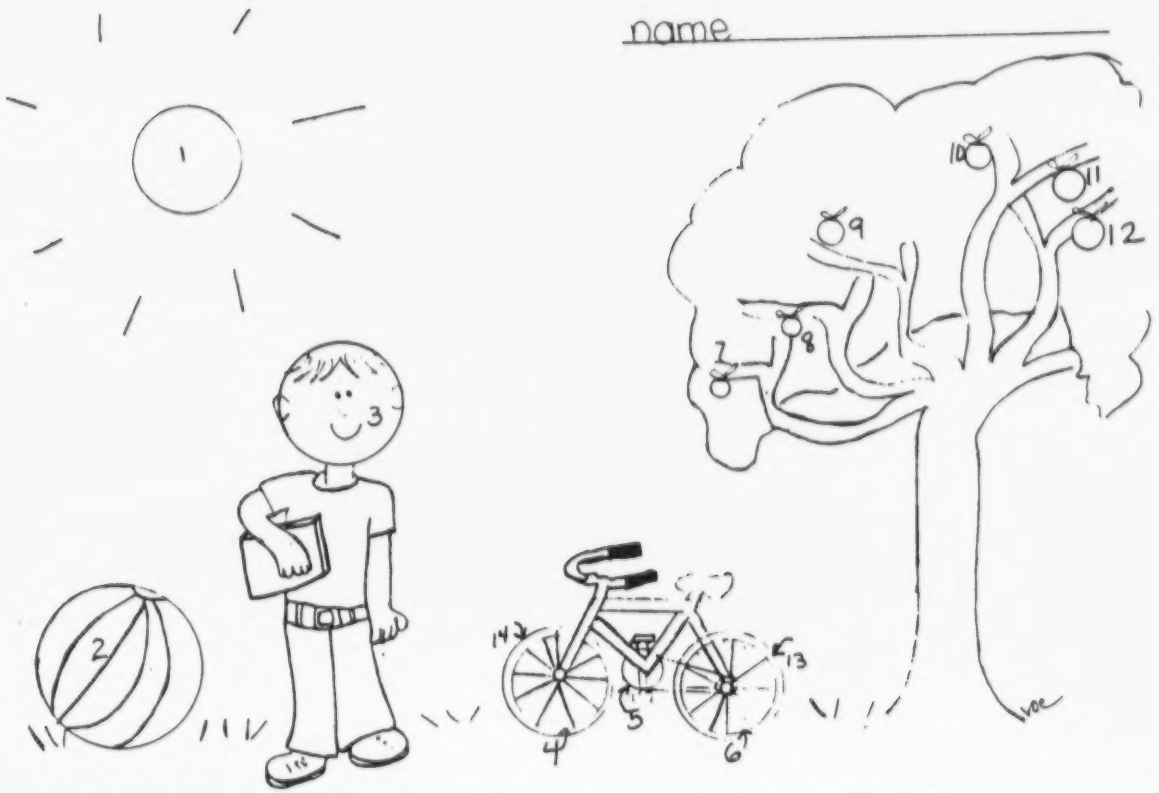
name _____

Match the shapes to these objects. Draw a line connecting the shapes to the objects.



Sheet B

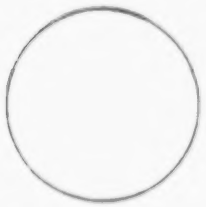
name _____

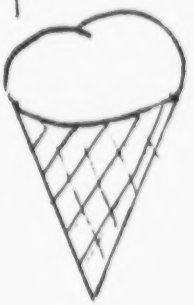


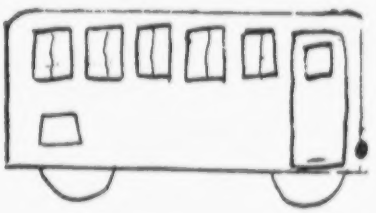
How many circles are in this picture? 14
Color the picture.

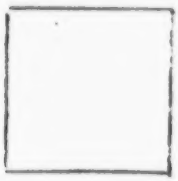
name _____

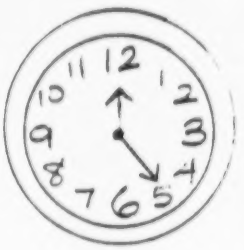
Match the shapes to these objects. Draw a line connecting the shapes to the objects.

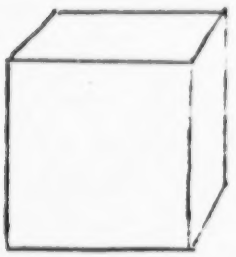












name _____

41

How many circles are in this picture?
Color the picture.

TEACHER SHEET
SECOND GRADE - MATH

This sheet allows students to discover the shapes of objects in their classroom. This exercise also allows them to draw the different shapes and to see how the different shapes fit into their classroom.

name _____

Find some objects in your classroom. that have the shape of a circle. Draw them below.

clock,
globe
door knob
ball
glass
etc.

Find some objects that have the shape of a square. Draw them below.

desk
window
chair
blackboard
etc.

name _____

Find some objects in your classroom. that have the shape of a circle. Draw them below.

Find some objects that have the shape of a square. Draw them below.

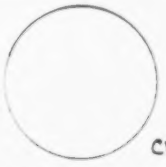
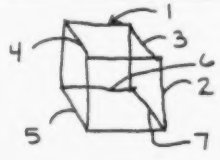
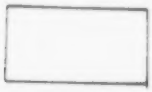
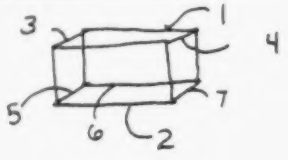
TEACHER SHEET
THIRD GRADE - MATH

A two dimensional object is usually a representation of a three dimensional object. Even a flat piece of paper has depth that humans can perceive...it is just difficult to draw. To help students with this exercise you may have items like a ball or cube available so they can visualize the drawing. Also, as shown below, most of these drawings are easy if you draw them step by step. The numbers on the drawing refer to which is drawn first. You don't have to be an artist to draw three dimensional.

name

What is the difference between
2 dimensional (2D) and 3 dimensional (3D)

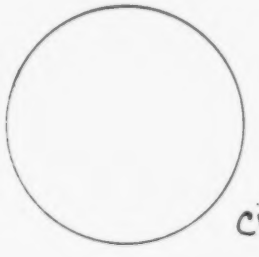
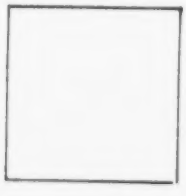
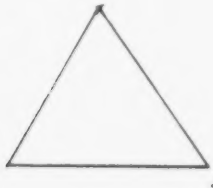
3 dimensional has relief, 2 dimensional is flat

2D	Draw the 3d and name it
 circle	
square	
triangle	
 rectangle	

name _____

What is the difference between:

2 dimensional (2D) and 3 dimensional (3D)

2D	Draw the 3d and name it
 circle	
 square	
 triangle	
rectangle	

TEACHER SHEET
HOW DO I PLOT DATA?

Sheet A. This exercise allows students to measure and collect data. The students can also discuss the characteristics of the different flags.

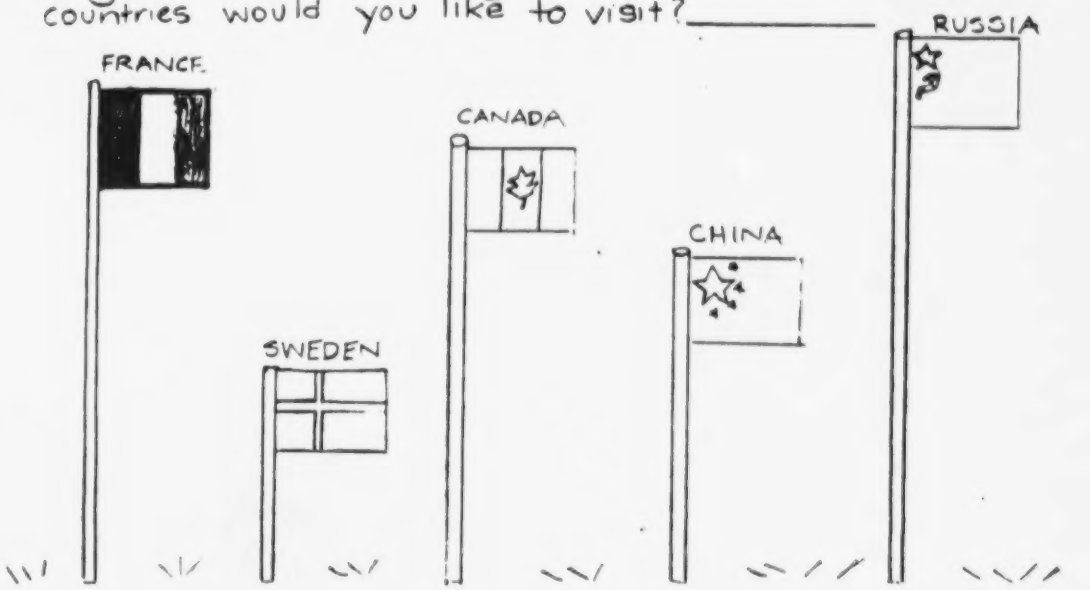
Sheet B. The students plot the data they have collected. The bars can be in any order.

Sheet C. This sheet allows students to interpret their bar graphs to anwser these questions. Mathematical skill are needed to anaswer these questions.

Sheet A

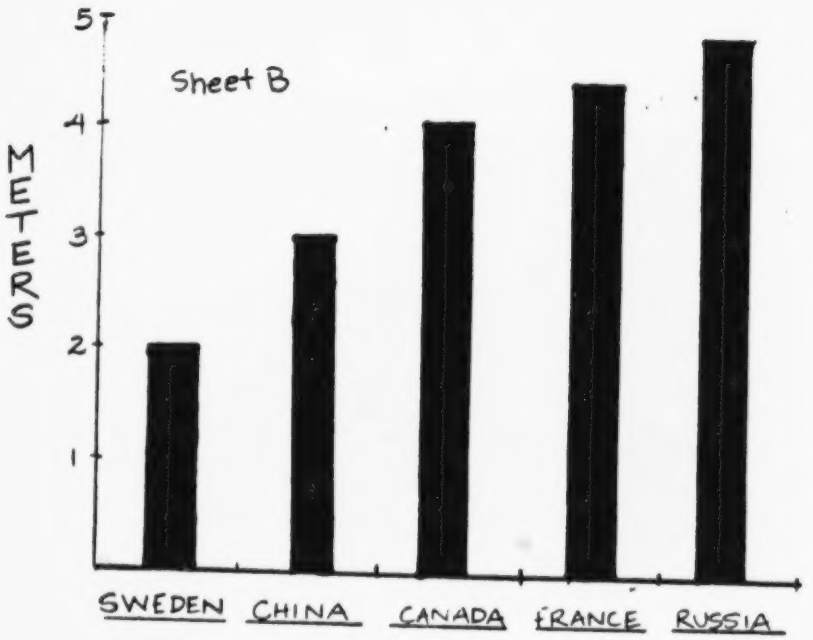
Name _____

Measure the height of each flag pole. Record the height below each flag pole. Which of these countries would you like to visit?_____



4½ meters 2 meters 4 meters 3 meters 5 meters

Note: ——— ⇦ This length represents 1 meter.
1 meter



Sheet C

1. Which country has the tallest flagpole? Russia
   Which country has the shortest flagpole? Sweden

2. What is the difference between the tallest and shortest flagpole? 3 meters

3. How much taller than China's flagpole is Canada's flagpole? 1 meter

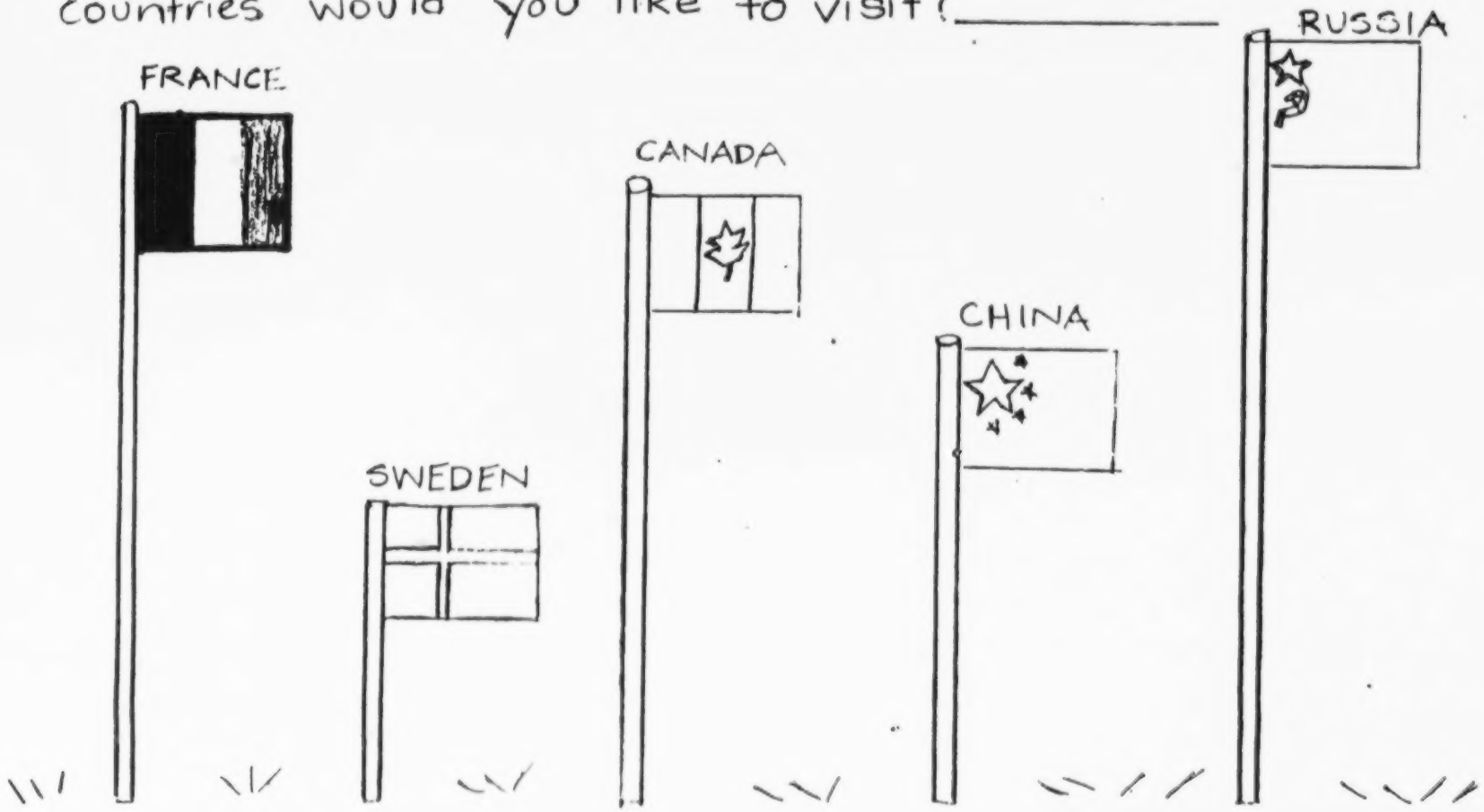
4. How much shorter than Russia's flagpole is Sweden's flagpole? 3 meters

5. Which flagpoles are shorter than 3½ meters? China's and Sweden's flagpoles

6. Which flagpoles are taller than 4 meters? France's and Russia's flagpoles

Name _____

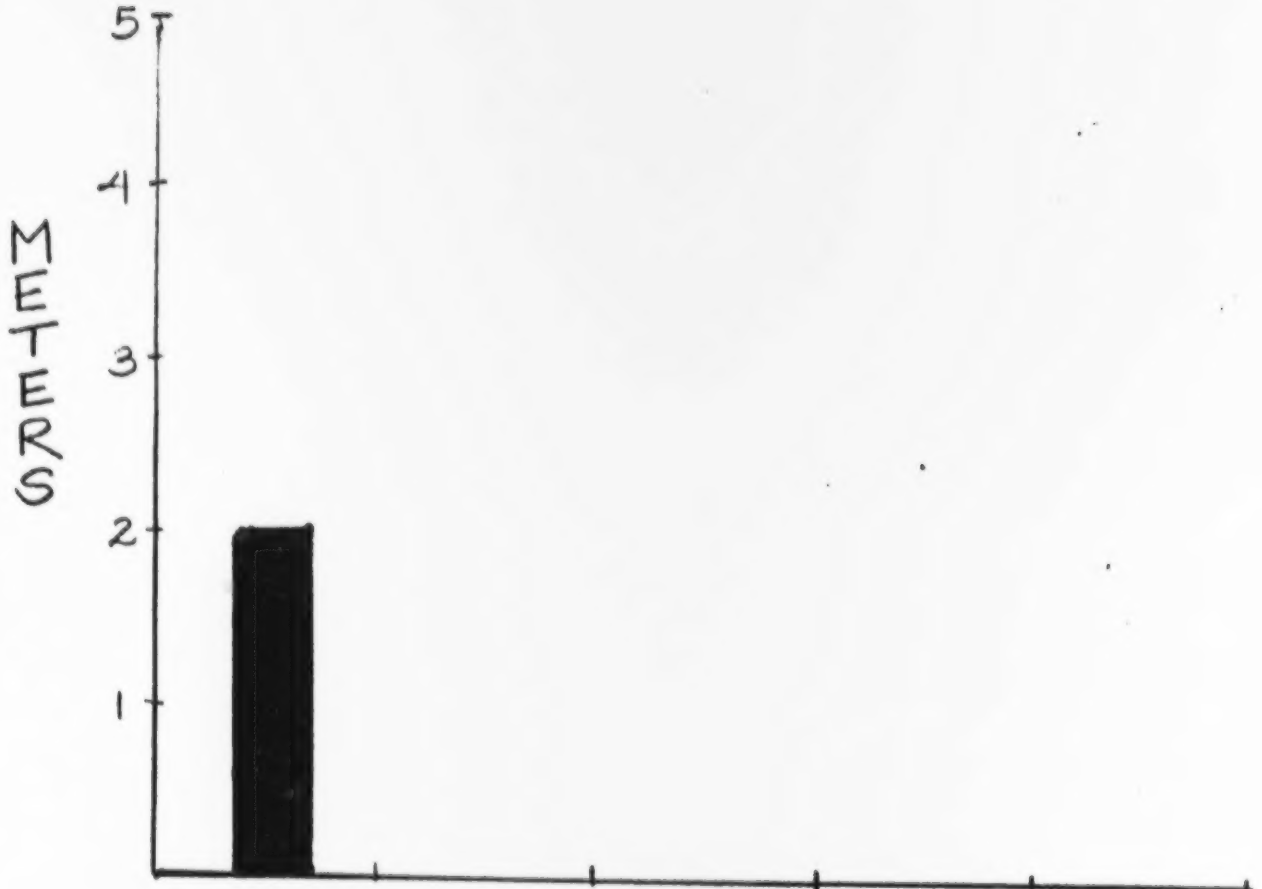
Measure the height of each flag pole. Record the height below each flag pole. Which of these countries would you like to visit? _____



_____meters _____meters _____meters _____meters _____meters

Note: ——— ⇦ This length represents 1 meter.
1 meter

Name _____



_____ _____ _____ _____

Write the names of the countries on the bottom lines. Draw bars showing the height of the flag-poles of each country. See the example.

Name _____

Look at your bar graph and answer the following questions.

1. Which country has the tallest flagpole? _____
   Which country has the shortest flagpole? _____

2. What is the difference between the tallest and shortest flagpole? _____

3. How much taller than China's flagpole is Canada's flagpole? _____

4. How much shorter than Russia's flagpole is Sweden's flagpole? _____

5. Which flagpoles are shorter than 3½ meters? _____
   _____

6. Which flagpoles are taller than 4 meters? _____
   _____

TEACHER SHEET
SIXTH GRADE - MATH

Plotting data on a circle graph can be very difficult. Make sure the students can break the graph into 50%, 25%, and 10% areas. They don't necessarily have to know percentage to do this exercise. Have them "guess" which is the closest fit to the above breakdown and have them draw an approximate piece of pie. If they have trouble with this, bring in a small pie that groups of four have to share....they will learn very quickly how much is 25% of the whole!

name _____

California's Water

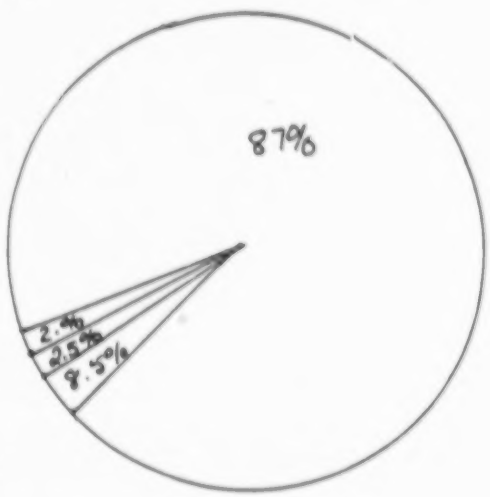
The major users of California's water:

Agriculture
87% (blue)

Domestic & Commercial
8.5% (red)

Manufacturing
2.0% (green)

Other
2.5% (yellow)



directions:

Using the percentages given, divide the circles into the correct proportions and color code each section using the colors indicated.

Where California's Water Supply Is Located:

North Coast
40% (blue)

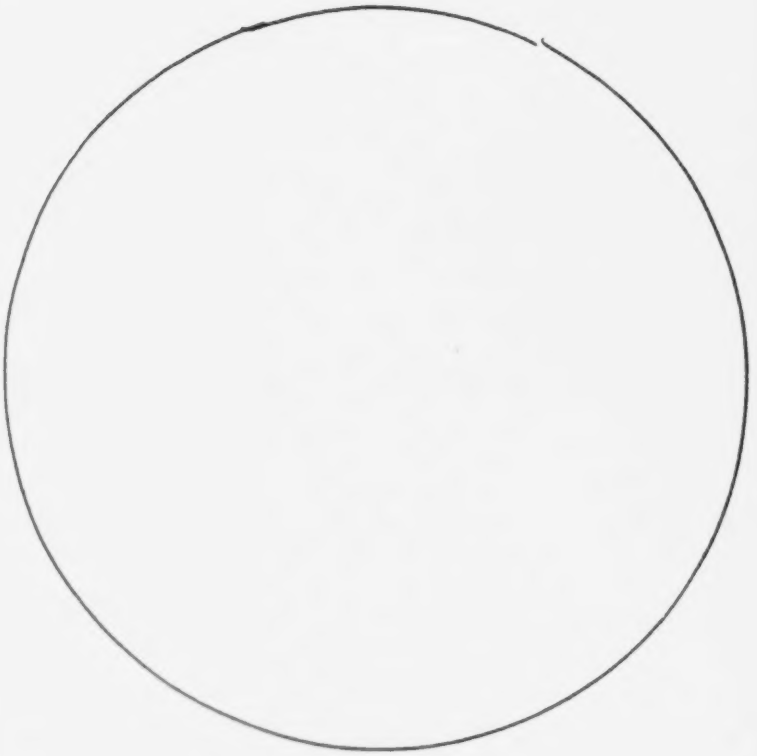
Sacramento
31% (red)

San Joaquin
9.0% (green)

Other (Ce Sierras)
20% (yellow)

name _____

California's Water

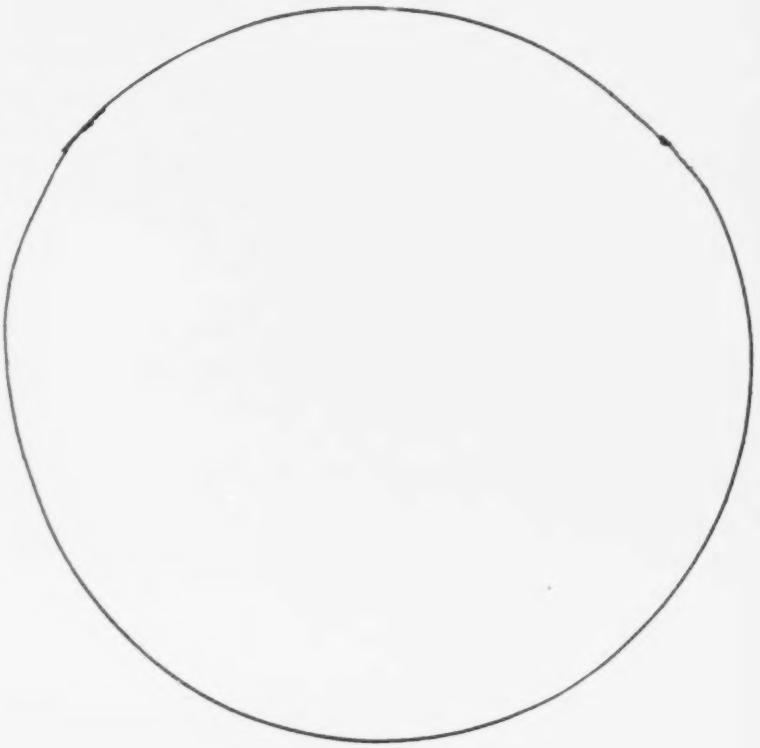


The major users of California's water:

- Agriculture
  - 87% (blue)
- Domestic & Commercial
  - 8.5% (red)
- Manufacturing
  - 2.0% (green)
- Other
  - 2.5% (yellow)

directions:

Using the percentages given, divide the circles into the correct proportions and color code each section using the colors indicated.



Where California's Water Supply Is Located:

- North Coast
  - 40% (blue)
- Sacramento
  - 31% (red)
- San Joaquin
  - 9.0% (green)
- Other (ie Sierras)
  - 20% (yellow)

SCIENCE, MATH, AND TECHNOLOGY

BUILT ENVIRONMENT

Teaching students how cities have impacted nature is essential towards creating future environmentally aware citizens. Population, pollution and resource depletion are major problems requiring solutions within your students lifetime.

LOWER PRIMARY

A. WHAT IS MAN-MADE? - Are cities man-made? What is a city? Are cities good? Does everyone live in a city?

B. WHAT IS WILDLIFE? -
What kinds of plants and animals live in cities? What happens to wildlife living where something is to be built? Why are there no big animals in the city? Should we respect where other animals live? Are we cutting down all our trees for building cities?

C. WHERE DOES OUR GARBAGE GO?
Where does our sewage go? Are some types of garbage worse than others? What is solid waste? How do we get rid of garbage? What is recycling? Is garbage a problem?

D. HOW IS LAND USED? - How much land is taken up by cities? What is the urban heat is land? How do buildings change the speed and direction of wind? Does bulldozing and other earth-moving methods harm land? Is land contaminated? Are pollutants in the soil dangerous to plants and animals? How can we conserve our land?

UPPER PRIMARY

E. IS OUR WATER AND AIR SAFE? - Is our air safe to breathe? Is our water safe to drink? What does pollution mean? How does our air and water become polluted? Can pollution hurt us? Can we live without clean air and water? How do people control water? What is water conservation? How toxic is our environment?

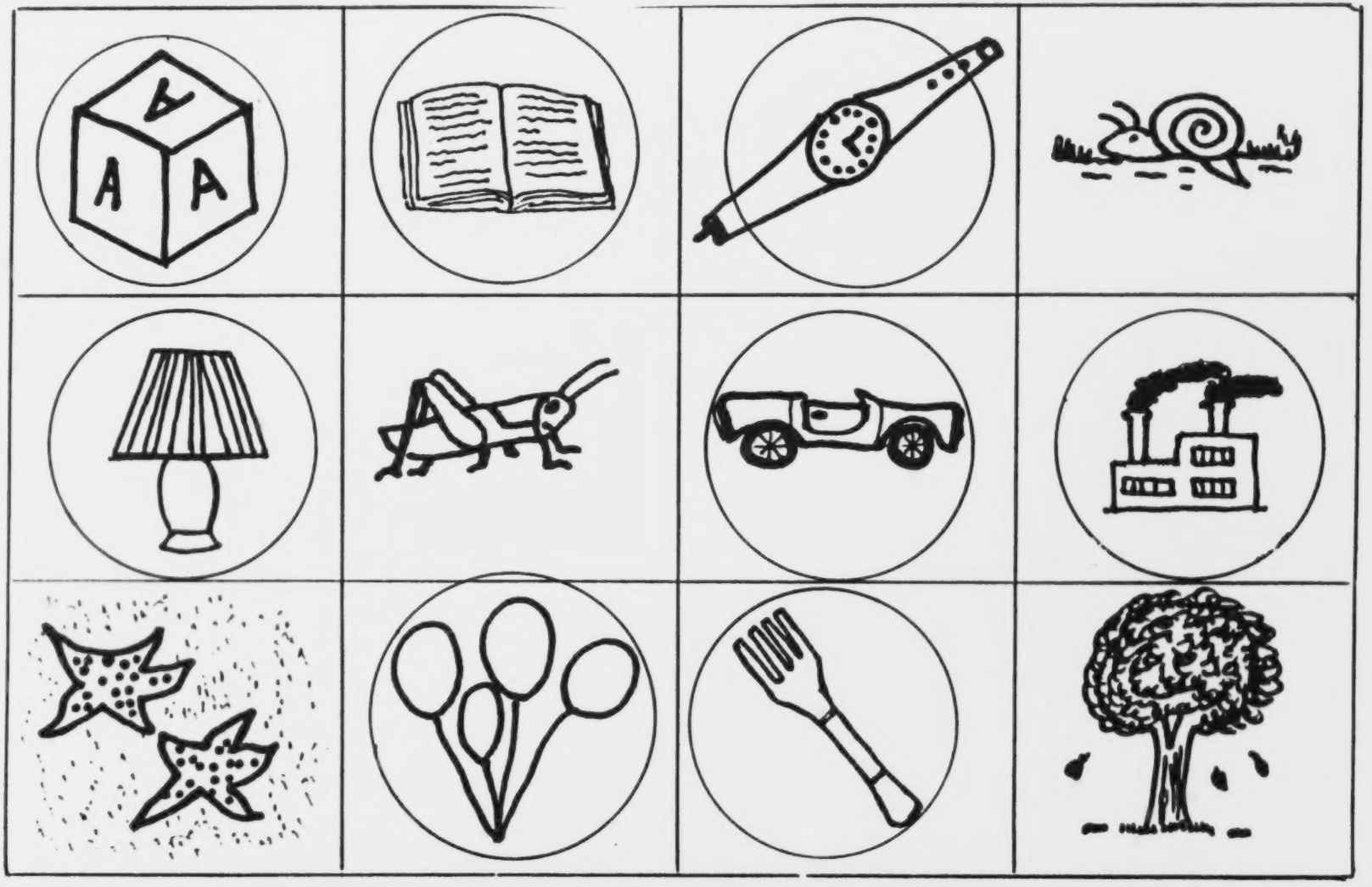
F. IS THERE TOO MANY PEOPLE? - Can too many people cause problems? What is zero population? How are people distributed around the world? Is overpopulation to blame for all our problems?

G. HOW ARE CITIES MADE?
Is there a plan to build? Is building up a good idea? Can we improve existing cities? How can we build better cities? What kind of cities can we build in the future?

NAME TEACHER SHEET

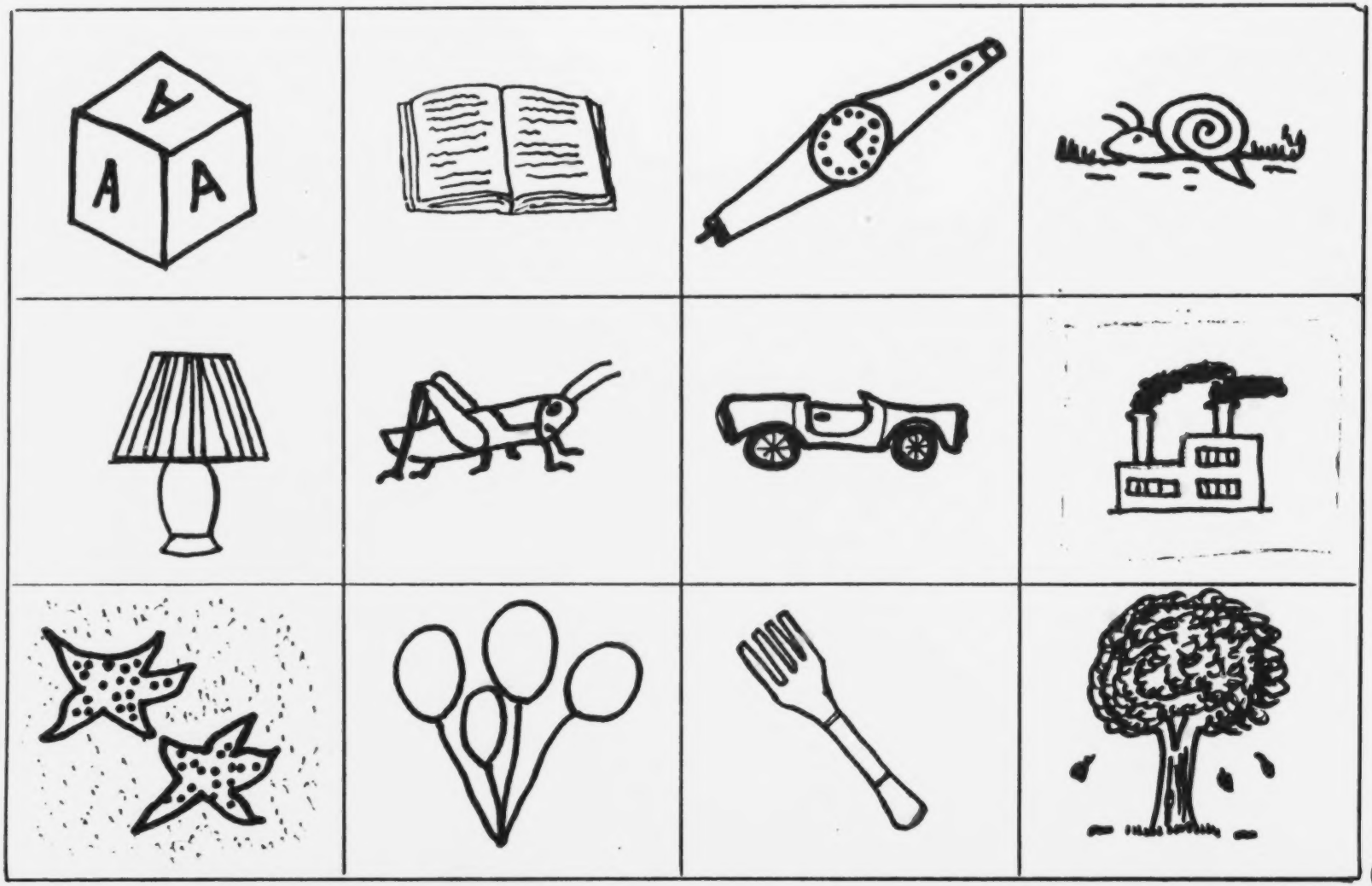
WHAT IS MAN-MADE ?

HAVE STUDENTS CIRCLE THOSE ITEMS WHICH ARE MADE BY HUMANS. REMEMBER THAT OBJECTS OBTAINED FROM NATURAL THINGS SUCH AS PAPER FROM TREES HAVE BEEN ALTERED, HENCE, THEY ARE NON-NATURAL OR MAN-MADE.



NAME_____

WHAT IS MAN-MADE ?

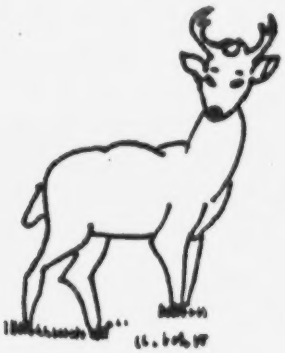


name _____ TEACHER SHEET

STUDENTS LEARN THAT WILD ANIMALS ARE THOSE WHICH ARE NON-DOMESTICATED OR NOT TAMED BY MAN FOR PETS OR FOR LIVESTOCK. (* sometimes even those animals we think of as pets can become "wild" if left alone to live away from people, ie. feral cats)

Am I Wild?

YES

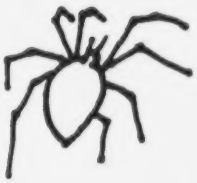


YES

NO

NO

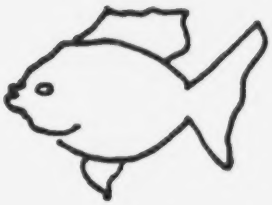
YES



YES

NO

YES

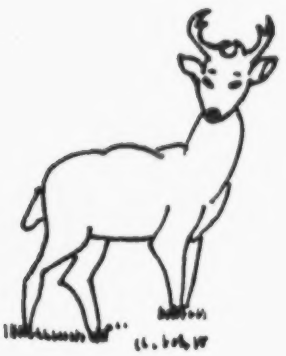


NO

name _____

Am I Wild?

_____

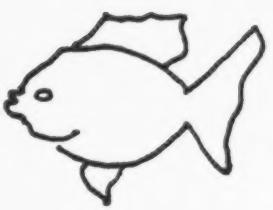


_____

_____

_____

_____



_____

NAME teacher sheet

WHERE DOES OUR GARBAGE GO?
(solid waste)

SOLID WASTE is any useless unwanted or discarded material that is not a liquid or a gas.

MAJOR TYPES OF GARBAGE ARE:

1. paper
2. glass
3. metal
4. plastics
5. rubber

** Over 90% of all solid wastes is deposited on or under land. **

MOST COMMON METHODS TO DISPOSE OF SOLID WASTES:

1. open dumps - where everything is dumped directly on land uncovered.

2. sanitary landfill - where wastes are spread in layers then compacted and covered with a fresh layer of soil each day.

3. resource recovery process - where recyclable materials are separated out from the rest then taken elsewhere to be processed into useful products once again.

4. open burning dumps - where garbage is simply dumped and set to burn. (this method is on its way out).

FUN WITH GARBAGE

(I) Make a record of one day's trash by:
   a. listing the no. of trash items dumped in the classroom garbage can for one day.

   b. categorize trash items dumped for a day using the headings - paper, glass, metal, plastics, rubber, and other.

(II) Trace the destination of one trash load in the classroom. Example: small garbage container in classroom - janitor's large trash container - outdoor school dumpster - city dump truck - (have children complete the path)

Name: TEACHER SHEET

HAVE STUDENTS PRACTICE PENMANSHIPMBY WRITING THE WORDS BELOW. THESE FIVE WORDS ARE THE FIVE MAJOR TYPES OF GARBAGE FOR THE UNITED STATES.

GARBAGE

LOOK SPELL

Paper

Glass

Metal

Plastic

Rubber

Name:

GARBAGE

LOOK SPELL

Paper

Glass

Metal

Plastic

Rubber

NAME teacher sheet

LAND

There is only so much land on earth, and the most important factor of land is its SURFACE AREA or the total spread of land on earth. There are several things humans have done to the land to damage its quality. The major ones are: (1) building on good productive land, (2) the removal of plants have created "man-made deserts" (3) erosion of soil created by bad agricultural practices, and (4) population growth which increases the demand for living space, food supply (agriculture) and building materials (lumber and metal resources).

LIST SOME USES OF LAND IN YOUR CITY.

THIS EXCERCISE WILL SHOW STUDENTS THE DIVERSITY OF LAND USE WITHIN THEIR CITY. POINT OUT TO STUDENTS THAT THE VARIETY OF LAND USES OF AN AREA DEPENDS ON WHAT GOES ON THERE. FOR EXAMPLE, NAPA VALLEY AND LIVERMORE ("SILICON VALLEY") HAVE TWO DISTINCT AND SEPERATE TYPES OF LAND USE. YOU HAVE CROPS IN ONE CASE AND "HIGH TECH" INDUSTRY ON THE OTHER.

OTHER EXAMPLES:

GRASSLAND	HIGHWAYS
RANGELAND	FREEWAYS
PASTURELAND	CITY STREETS
FOREST OR WOODLAND	* RESIDENTIAL
COASTLAND	** COMMERCIAL
CROPLAND	*** INDUSTRIAL
RURAL OR THE COUNTRY	PARKS

*Residential - where tracts of homes are located.

**Commercial - where products are sold for profit.

***Industrial - where goods are produced or manufactured.

NAME_____

LAND

There is only so much land on earth, and the most important factor of land is its SURFACE AREA or the total spread of land on earth. There are several things humans have done to the land t damage its quality. The major ones are: (1) building on good productive land, (2) the removal of plants have created "man-made deserts" (3) erosion of soil created by bad agricultural practices, and (4) population growth which increases the demand for living space, food supply (agriculture) and building materials (lumber and metal resources).

LIST SOME USES OF LAND IN YOUR CITY.

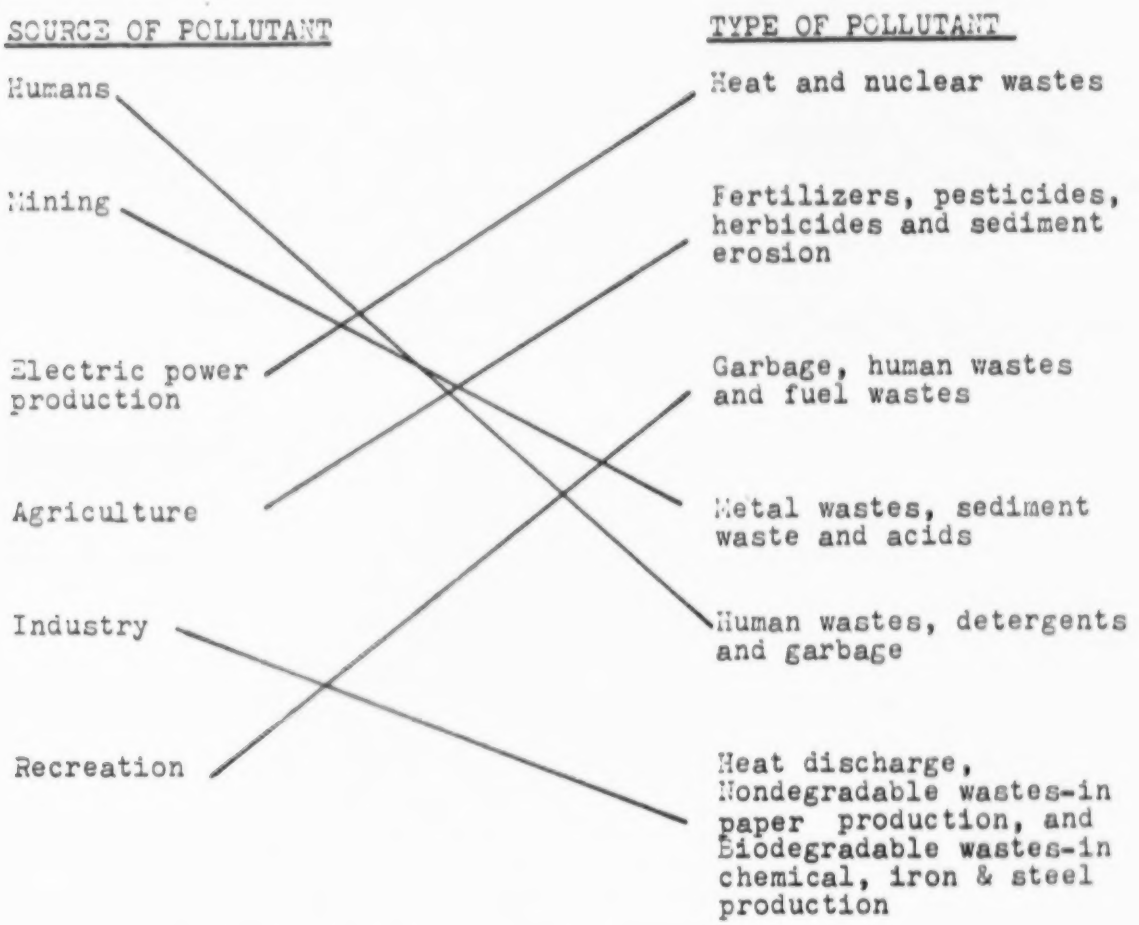
NAME _____ teacher sheet

POLLUTION

Although pollution of water and air occurs without human interference from natural causes such as landslides, forest fires and volcanic eruptions, most air pollution is the result of human action.

Air Pollution

Directions: Match the source of air pollution to the type of pollutant created from each source.



NAME _____

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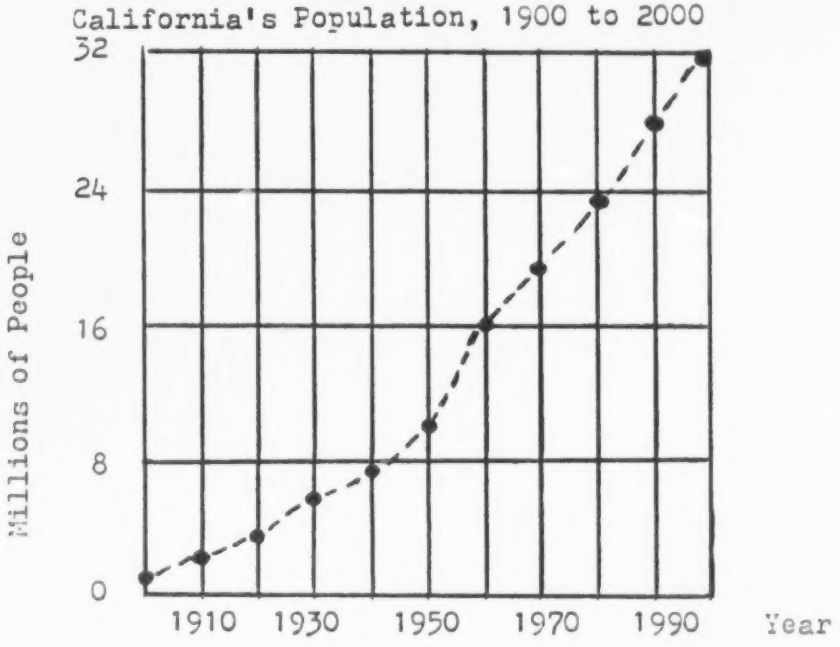
SOURCE OF POLLUTANT	TYPE OF POLLUTANT
Humans	Heat and nuclear wastes
Mining	Fertilizers, pesticides, herbicides and sediment erosion
Electric power production	Garbage, human wastes and fuel wastes
Agriculture	Metal wastes, sediment waste and acids
Industry	Human wastes, detergents and garbage
Recreation	Heat discharge, Nondegradable wastes-in paper production, and Biodegradable wastes-in chemical, iron & steel production

NAME TEACHER SHEET

STUDENTS LEARN TO READ GRAPHS. HAVE THEM FOLLOW THE INSTRUCTIONS AND ANSWER THE QUESTIONS.

POPULATION

(reading graphs)

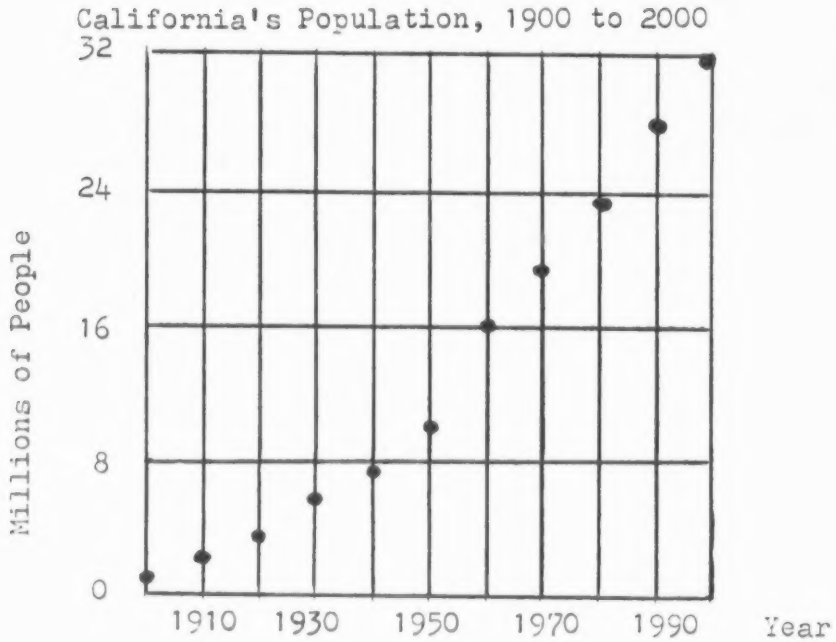


1. CONNECT THE DOTS.
2. From 1900 to the year 2000, has California's population increased or decreased? INCREASED
3. During the year 1970, what was California's population? 19 MILLION
4. From 1960 to the year 2000, will California's population double or triple? DOUBLE
5. What will be the result if California's population growth continues at the rate as shown in the graph above? (1) RUN OUT OF SPACE TO LIVE, (2) SHORTAGE OF HOUSING, (3) NOT ENOUGH FOOD, (4) INCREASED USE OF NATURAL RESOURCES - TIMBER, WATER, OIL ETC. AND (5) POLLUTION INCREASE.

NAME_____

POPULATION

(reading graphs)



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_____

_____

_____

_____

NAME TEACHER SHEET

THE CITY OF THE FUTURE WILL BE . . .

PICTURE

OR

DRAWING

HAVE YOUR STUDENTS PLAN THEIR CITY OF THE FUTURE. HAVE THEM PLAN CITIES WHICH ATTEMPT TO SOLVE MANY OF TODAY'S URBAN PROBLEMS: (1) OVERPOPULATION, (2) TRANSPORTATION, (3) HUNGER, (4) POLLUTION OF LAND AIR AND WATER, (5) NATURAL RESOURCE DEPLETION AND SO ON.

EXAMPLES: SPACE COLONIES

UNDERWATER CITIES

FLOATING CITIES

CITIES UNDERGROUND

NAME_____

THE CITY OF THE FUTURE WILL BE . . .